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| 10/656,641 | 09/05/2003 | Shuit-Tong Lee | 13896-0007 | 8111 |
| 25267 | 7590 | 07/01/2004 | EXAMINER | |
| BOSE MCKINNEY & EVANS LLP 135 N PENNSYLVANIA ST SUITE 2700 INDIANAPOLIS, IN 46204 | | | GARRETT, DAWN L | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 1774 | |

DATE MAILED: 07/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/656,641

Applicant(s)

LEE ET AL.

Examiner

Dawn Garrett

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 3 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. It is not seen how the limitations of claim 3 further limit the cathode described in parent claim 1, because claim 3 merely sets forth the same information by which the cathode is described in claim 1.
2. Claim 18 is objected to because of the following informalities: The phrase "metals alloys" should be changed to "metal alloy". Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claims 9 and 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
5. The use of the word "including" in claim 9 is confusing. It is unclear if metals other than gold, iridium, molybdenum, palladium and platinum can form the anode. For the purpose of examination, the claim has been interpreted such that one of the specifically named metals must be present in the anode.

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6. The phrase "other conductive materials" is indefinite, because it is not clear what other types of materials are included other than elemental metals and metal alloys. Clarification and/or correction are required.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1, 3-5, 8, and 10-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Tang et al. (US 4,885,211). Tang et al. discloses in Example 3 an organic electroluminescent device comprising a glass substrate, ITO anode, ATQ-1 layer, CO-1 layer (which is Alq – see col. 16, lines 42-43), and a rare earth cathode (see col. 20, lines 1-20). The cathode is comprised of silver (the conductive metal) and europium (the rare earth) prepared by co-evaporation (see col. 20, lines 7-10). The Alq layer reads upon the organic electroluminescent layer of instant claim 1 and claim 10. The substrate of Example 3 is glass and is transparent with regard to claims 4 and 5. The Example 3 anode is formed of indium tin oxide (ITO), which is transparent, with regard to claim 8. The Example 3 cathode comprises europium with regard to claim 11. Disposed with the europium in the Example 3 cathode is silver with regard to claim 12.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 2, 6, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tang et al. (US 4,885,211). Tang et al. is relied upon as set forth above. With regard to claim 2, Tang et al. fails to exemplify a cathode that is transparent, but does clearly teach that the cathode may be transparent at col. 5, lines 34-47 and at col. 6, lines 18-22. Furthermore, with regard to claim 6, Tang et al. fails to exemplify an opaque substrate; however, Tang clearly teaches that an opaque substrate may be used for the device (see col. 6, lines 23-26). In addition, with regard to claim 9, Tang et al. fails to exemplify an anode other than one comprised of indium tin oxide. Tang et al. does teach other suitable materials for forming an anode such as metals chosen from among the high (>4) work function metals listed in the tables in columns 7 and 8 (see col. 18, lines 38-51). The metals listed in the tables with work functions higher than 4 eV include gold, iridium, molybdenum, palladium, and platinum (see lists in columns 7 and 8). It would have been obvious to one of ordinary skill in the art at the time of the invention to have formed an organic electroluminescent device with a transparent cathode, high work function metal anode, and an opaque substrate according to the claims, because Tang et al. generally teaches all of these features as suitable for an electroluminescent device and one would have expected these features to perform similarly compared to the exemplified devices.

11. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tang et al. (US 4,885,211) in view of Lee et al. (US 2003/0082403). Tang et al. is relied upon as set forth above. While Tang et al. teaches at col. 6, lines 23-26 that the substrate may be opaque, Tang et

al. fails to teach the opaque substrate may include substrates formed from ceramics or semiconductors. Lee et al. teaches in analogous art that glass substrates, semiconductor substrates, and ceramic substrates are equivalent substrate materials for organic electroluminescent devices and teaches that ceramic and semiconductor substrates are opaque substrates (see par. 21). It would have been obvious to one of ordinary skill in the art at the time of the invention to have selected a ceramic or semiconductor substrate for the opaque substrate taught by Tang et al., because Lee et al. teaches ceramic and semiconductor substrates are used in the art of electroluminescent devices and one would have expected the ceramic and semiconductor substrates to perform similarly to the glass substrates exemplified by Tang et al. due to the equivalency teaching of Lee et al.

12. Claims 13-15 and 17-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yu et al. (US 2004/0094768 A1). Yu et al. teaches organic electroluminescent devices (see abstract). Yu et al. teaches the devices may include a cathode comprised of rare earth lanthanides and actinides as well as conductive metals such as aluminum or magnesium or a metal alloy. The cathode may be comprised of a multiple layer form with each layer containing a different metal or metal alloy composition (see par. 65). Although Yu et al. fails to exemplify a cathode comprising two layers with the innermost layer comprising the rare earth actinide or lanthanide element and the outermost layer comprising a conductive layer such as aluminum, magnesium or an alloy, it would have been obvious to one of ordinary skill in the art to have formed such a bi-layer cathode, because Yu et al. teaches all the required materials and also that multiple layers may be formed for the cathode. Such a bilayer configuration reads upon layer b) and layer c) of the device in claim 13. With regard to the fluoride layer a) between the organic

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electroluminescent layer and the rare earth metal layer b), Yu et al. teaches an un-patterned layer to facilitate electron injection/transport deposited prior to the cathode layer (see par. 63). The unpatterned layer may be comprised of lithium fluoride (LiF) per instant claims 14 and 15 (see par. 63). With regard to claim 17, Yu et al. specifically teaches cerium, samarium, europium as well as all lanthanides (see par. 65). The metals aluminum and magnesium as well as the alloys taught for the cathode read upon the elemental metals and metal alloys of claim 18 (see par. 65). Yu et al. teaches the use of glass as the substrate to support the device and teaches an ITO (indium tin oxide) coating on the glass as the anode per instant claims 19 and 20 (see ex. 13, par. 145). Per instant claim 21, Yu et al. teaches Alq as a component in the light emitting layer (see Table 4, page 7).

13. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yu et al. (US 2004/0094768 A1) in view of Gotou (US 2003/0113581 A1). Yu et al. is relied upon as set forth above for the teaching of LiF as an electron transporting/injecting facilitating layer adjacent the cathode layer (see Yu et al. par. 63). Yu et al. fails to teach alkaline earth metal fluoride may be used as well as the alkali metal fluoride, LiF. Gotou teaches, in analogous art, organic electroluminescent devices. At paragraph 84, Gotou teaches lithium fluoride and magnesium fluoride as equivalent materials for forming an electron injecting layer in an organic electroluminescent device. It would have been obvious to one of ordinary skill in the art to have used magnesium fluoride in place of lithium fluoride as the electron injecting layer in the Yu et al. device, because Gotou teaches LiF and MgF_2 as equivalent materials for an electron injecting layer and one would have expected the Yu et al. device to operate similarly with the use of MgF_2 compared to a device using LiF.

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Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dawn Garrett whose telephone number is 571-272-1523. The examiner can normally be reached Monday through Friday during normal business hours. Please allow the examiner twenty-four hours to return your call.

If reasonable attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly, can be reached at 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dawn Garrett

DAWN GARRETT
EXAMINER
ART UNIT 1774

D.G.
June 25, 2004